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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037			EXAMINER CALANDRA, ANTHONY J	
			ART UNIT 1791	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/583,712

Applicant(s)

BUCHERT ET AL.

Examiner

ANTHONY J. CALANDRA

Art Unit

1791

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☒ Claim(s) 12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SF/ICE)
Paper No(s)/Mail Date 6/20/2006, 10/02/2006, 6/20/2007
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

Detailed Office Action

The communication dated 6/20/2006 has been entered and fully considered.

Claims 1-34 are currently pending.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

1. Claims 1-6, 9-14, 16-33 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of copending Application No. 10/583711. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant application discloses oxidizing a lignocellulosic material and then attaching a modifier to said fiber which gives the fiber properties foreign to said fiber. The copending application teaches oxidizing fiber and attaching a signaling agent. An agent that acts as a signaling agent gives the fiber properties foreign to said fiber.

Instant claims 1, 2, 5, 6, 16, and 17 see copending claims 1, 2, 3, and 12.

Instant claim 3 see copending claim 4.

Instant claim 4 see copending claim 5, 6, and 7.

Instant claim 9, 10-14 see copending claims 5-11.

Instant claim 18 see copending claims 10 and 11.

Instant claims 19-22 see copending claims 12-15.

Instant claims 23, 24, 18, and 29 see copending claims 16-18.

Instant claim 25 see copending claim 19,

Instant claim 26 see copending claim 20.

As for instant claim 27, the fibrous web is a well known place for adding chemical agents, in places such as the size press.

Instant claim 30 see copending claim 12.

As for instant claim 31, the claim states both possibilities of adding the reagents and thus is obvious.

Instant claims 32 and 33 see copending claims 1, 5, 6, and 9. Examiner has interpreted 'color change' of copending claim 9 to encompass whitening. Whitening and bleaching is an obvious color change for paper.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

2. Claims 1-14, 16-31 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4, 6, 8-12, 16-23 and 26 of copending

Application No. 10/583849. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant application discloses oxidizing a lignocellulosic material and then attaching a modifier to said fiber which gives the fiber properties foreign to said fiber. The copending application teaches oxidizing fiber and attaching a modifying agent and then a conductive polymer. The conductive monomer can be the same or different from the bi-functional modifying substance. Conductive properties are properties foreign to fibers.

Instant claims 1, 2, 5, 6, 16, and 17 see copending claims 1, 2, 4, 11 and 12.

Instant claim 3 see copending claim 3.

Instant claim 4 see copending claims 1 and 2. Conductivity acts as a signaling agent.

Instant claims 7 and 8 see copending claim 6.

Instant claim 9, 10-14 see copending claims 6-10.

Instant claim 18 see copending claims 8-10.

Instant claims 19-22 see copending claims 16-19.

Instant claims 23, 24, 28, and 29 see copending claims 21-23.

As for claim 25 the copending claims state that the agents are added to a slurry (claim 22). At the time of the invention it would have been *prima facie* obvious to optimize the slurry consistency to the broad consistency range disclosed.

Instant claim 26 see copending claim 20.

As for instant claim 27, the fibrous web is a well known place for adding chemical agents, in places such as the size press.

As for instant claim 30, pulp will be exposed to light during the paper making process.

As the instant claim does not state how much light the pulp is exposed to, the copending claims anticipate said claim. Examiner notes that it is well known that ultraviolet light is used with peroxide for advanced oxidation processes.

Instant claim 31 see copending claim 26.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

3. Claims 1-14, 16-31 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-10, 12, 15-22 of copending Application No. 10/583339. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant application discloses oxidizing a lignocellulosic material and then attaching a modifier to said fiber which gives the fiber properties foreign to said fiber. The copending application teaches oxidizing fiber and attaching a modifying agent and then a contacting a hydrophobic polymer. A hydrophobic polymer gives the fiber properties different then the fiber

Instant claims 1, 2, 5, 6, 16, and 17 see copending claims 1 and 2.

Instant claim 3 see copending claim 3.

Instant claim 4 see copending claim 1. A hydrophobic polymer acts as a signaling agent.

Instant claims 7 and 8 see copending claims 5 and 6.

Instant claim 9, 10-14 see copending claims 7-10.

Instant claim 18 see copending claims 7-10.

Instant claims 19-22 see copending claims 12, 15-17.

Instant claims 23, 24, 28, and 29 see copending claims 18, 19, and 20.

Instant claim 25 see copending claim 4.

As for instant claim 26, the copending claims do not disclose temperature; however at the time of the invention it would have been prima facie obvious to optimize temperature.

As for instant claim 27, the fibrous web is a well known place for adding chemical agents, in places such as the size press.

Instant claim 30 see copending claim 21.

Instant claim 31 see copending claim 22.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

4. Claims 1-14, 16-31 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4, 6, 8-12, 16-23 and 26 of copending Application No. 10/583340. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant application discloses oxidizing a lignocellulosic material and then attaching a modifier to said fiber which gives the fiber properties foreign to said fiber. The copending application teaches oxidizing fiber and attaching a modifying agent that prevents photoyellowing. An agent that prevents photoyellowing provides the fiber with a foreign property.

Instant claims 1, 2, 5, 6, 16, and 17 see copending claims 1, 3, 5, and 18.

Instant claim 3 see copending claim 4.

Instant claim 4 see copending claim 1, 3, 5, and 18. A brightness reversion agent acts as a color retention agent.

Instant claims 7 and 8 see copending claims 6 and 7.

Instant claim 9, 10-14 see copending claims 6, 7, and 8.

Instant claim 18 see copending claims 6, 7, and 8.

Instant claims 19-22 see copending claims 9-12.

Instant claims 23, 24, 28, and 29 see copending claims 13-15.

Instant claim 25 see copending claim 16.

Instant claim 16 see copending claim 17.

As for instant claim 27, the fibrous web is a well known place for adding chemical agents, in places such as the size press.

As for instant claim 30, pulp will be exposed to light during the paper making process.

As the instant claim does not state how much light the pulp is exposed to, the copending claims anticipate said claim. Examiner notes that it is well known that ultraviolet light is used with peroxide for advanced oxidation processes.

Instant claim 31 see copending claim 19.

Instant claims 32 and 33 see copending claims 18, 1, 5, 6, and 7. Examiner has interpreted colorless lignin derivative of claim 18, to be white in color.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Objections

5. Claim 12 is objected to because of the following informalities: Missing period.

Appropriate correction is required.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 9-13 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Applicant states that the groups are “capable of being modified”, however the applicant gives no teaching or suggestion of which groups can be modified or the process by which groups can be modified in the claim or specification. Further the applicant fails to disclose which groups act as antifungal, antibacterial, heatproof, flame-retardant, UV-resistant, antistatic, or insulative such that a person of ordinary skill in the art could graft a modifying compound with a functional group to obtain said desired properties.

7. Claim 30 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claim states that radiation capable of oxidizing the fibrous material should be used however, neither the specification nor the claim state in any manner how much radiation is needed, where and when the radiation is used on the fibrous material (low consistency, medium consistency, or once a sheet has been formed), and finally it is not clear whether the radiation requires or doesn't require the other oxidizing agents (the enzymes, peroxides etcetera).

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 8, 15, 22, 23, 30, 32- 34 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 8, the phrases "preferably" and "in particular" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

In regards to claims 15 and 34, it is not clear to the examiner which compounds the applicant considers as derivatives or structural analogs of the disclosed compounds. Therefore the examiner cannot determine the proper metes and bounds of patent protection desired by the applicant.

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 22 recites the broad recitation 1-100,000 nkat/g, and the claim also recites 10-500 nkat/g which is the narrower statement of the range/limitation. The claim also states the limitation .00001 to 10 mg of enzyme per gram of dry matter which is in fact a third range.

In claim 22, the applicant claims an enzyme dosage nkat/g (nanokatal/g) which the examiner has interpreted as an enzyme activity on pulp. However, the applicant does not state what the defined assay conditions this enzyme activity is measured. At different temperatures, pHs, and substrate being oxidized an enzyme can have different activities. Therefore the examiner cannot determine the proper metes and bounds of patent protection desired by the applicant.

The term "white color" in claims 32 and 33 is a relative term which renders the claim indefinite. The term "white color" is not defined by the claim, the specification does not provide

a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. There are varying degrees of whiteness/brightness of pulp. As such the examiner cannot determine how white/bright the lignocellulose needs to be to have a white color. The examiner has interpreted the claim as providing a "whiter color". By wording the claim "whiter" the agent need only provide a color that is whiter than the untreated lignocellulose. Claim 34 is dependent upon claims 23 and 33 and is similarly rejected.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1-6, 9-15, 22-29, 31-34 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. 2003/0186036 GOODELL et al., hereinafter GOODELL.

As for claim 1, 2, 5, 6, 15, 28, 29, 32-34, GOODELL discloses activating/oxidizing lignocellulosic materials and other phenoxy containing compounds [abstract, 0026 and 0029]. GOODELL discloses that the fiber is oxidized with peroxide and Fenton reagents [0023 and 0081]. GOODELL discloses the use of quercetin and kaemferol (kaempherol) [0099] during the reaction in addition to other compounds. As GOODELL uses the same chemical additives as the

instant claims (quercetin and kaemferol) said chemicals act as modifying agents. GOODELL further discloses increased whiteness with increased treatment time [Figure 7, decrease in light absorption of dyes when reacted with the peroxide, Fenton, mediator].

As for claim 3, GOODELL discloses that the agents act in a redox reaction therefore the Fenton reaction activates the modifying agent [0099-0101].

As for claim 4, GOODELL uses the same chemical additives as the instant claims (quercetin and kaemferol) said chemicals act as modifying agents which whiten the fibers. GOODELL further discloses increased whiteness with increased treatment time [Figure 7, decrease in light absorption of dyes when reacted with the peroxide, Fenton, mediator]. Further the modifying agents also act as signaling agents as the effect of light absorption can be detected.

As for claim 9-14, GOODELL discloses multiple compounds which are capable of being modified to add additional properties to said compounds [0099]. Examiner bases this on the fact that other compounds can be bonded to the compounds of GOODELL and thus provide the properties as disclosed. Quercetin, one of the compounds disclosed by GOODELL, can act as an antibacterial agent, act as a sensor by changing the color of the fiber (whitening) and also attenuates UV.

As for claim 23 and 24, GOODELL discloses both peroxide and oxygen containing compounds [0023].

As for claim 25, GOODELL discloses the consistency of 6% which falls within the instant claimed range [0164; 500 grams / 8500 grams].

As for claim 26, GOODELL discloses a liquid solution containing water [0164]. As the solution is liquid a person of ordinary skill in the art can surmise that the temperature is between

0 and a 100 degrees C which overlaps with the instant claimed temperature range with sufficient specificity.

As for claim 27, GOODELL discloses that the fiber is pressed to remove water forming a fiber mat, heated and cooled [0164]. Examiner has interpreted this as a fibrous web.

As for claim 31, GOODELL discloses that the chemicals were blended together which the examiner has interpreted as a simultaneous reaction.

10. Claims 1-6, 9-14, 23-33 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. 6,136,041 JASCHINSKI et al., hereinafter JASCHINSKI.

As for claim 1, 3, and 5, JASCHINSKI discloses contacting with an oxidizing compound [column 6 lines 1-11, abstract] while also contacting the pulp with a second compound including 1-10-phenanthroline a nitrogen containing compound which was found to greatly increase brightness [column 16 lines 1-28]. The second compound increases the brightness of the pulp and additionally ads nitrogen to the fiber. Therefore the compound acts as a modifying agent. JASCHINSKI discloses multiple compounds such as 1-10 phenanthroline which is a compound contains more than one functional groups including two imine groups. The additive helps activate the reaction [abstract].

As for claims 4, 9-14, JASCHINSKI discloses multiple compounds which are capable of being modified to add additional properties to said compounds [0099]. Examiner bases this on the fact that other compounds can be bonded to the compounds of JASCHINSKI and thus provide the properties as disclosed. JASCHINSKI discloses contacting the pulp with 1-10-phenanthroline a nitrogen containing compound which was found to greatly increase brightness

[column 16 lines 1-28]. In addition to affecting the brightness of the pulp, the nitrogen containing compound adds nitrogen to the fiber. Additional nitrogen would be detectable under mass-spectroscopy. The 1-10-phenanthroline affects the pulps negative/positive charge, acts a sensor, and affects the color of the fiber.

As for claim 2, 6, 23, 24, 28, and 29, JASCHINSKI discloses both hydrogen peroxide [claim 3] and discloses ozone which is an oxygen containing gas [claim 2] both of which are capable of oxidizing phenolic compounds.

As for claim 25, JASCHINSKI discloses the treatment consistency of 0.5 to 50% [claim 10] which overlaps with the instant claimed range with sufficient specificity.

As for claim 26, JASCHINSKI discloses the treatment temperature of 90 degrees C which falls within the instant claimed range [Table 10, 11, and 12].

As for claim 27, JASCHINSKI discloses the treatment consistency of 0.5 to 50% [claim 10]. At 50% consistency a majority of the water has been removed and the pulp can be considered a fibrous web.

As for claim 30, it is not clear the steps or the amount of radiation emitted onto the fiber, or consistency of the fiber. As paper web/pulp are subjected to light on a paper machine, at least some light radiation (including UV) strikes the pulp/paper web capable of oxidizing a phenol group. Examiner notes peroxide with ultraviolet light forms hydroxyl radicals, an advanced oxidation process.

As for claim 31, JASCHINSKI discloses adding the reactants simultaneously to the fiber [column 10 lines 20-60].

11. Claims 1-14, 16-33 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 6,187,136 PEDERSEN et al., hereinafter PEDERSON.

As for claim 1, 5, 32 and 33, PEDERSON discloses oxidizing lignocellulose phenol groups [column 8 lines 25-37] and then contacting the cellulose with a compound with a first functional group, Ferulic acid [column 10 lines 25-30]. Ferulic acid provides the fiber with a property that is foreign to the native fiber and acts as a signaling agent. Ferulic acid increases surface charge [column 10 lines 55-60] and can be detected with conductometric titration, therefore it provides the fiber with properties foreign to the fiber. Ferulic acid contains more than two functional groups. Ferulic acid also prevents photo-yellowing and this acts as a whitening agent.

As for claim 3, PEDERSON discloses that the fiber matrix is reacted with an enzyme oxidizing agents including laccase [column 6 lines 1-10 and column 10 lines 25-32]. PEDERSON discloses that the enzyme oxidizes the phenolic structures and that the mediator is bonded to the fiber. Therefore the mediator/signaling agent is activated [column 4 lines 1-35].

As for claim 4, ferulic acid provides the fiber with a property that is foreign to the native fiber and acts as a signaling/sensing agent. Ferulic acid increases surface charge [column 10 lines 55-60]. Further by increasing surface charge it can act as a retention agent retaining cationic materials.

As for claims 7 and 8, Ferulic acid contains an unsaturated carbon tail with 3 carbon groups.

As for claim 9-14, Ferulic acid provides the fiber with a property that is foreign to the native fiber and acts as a signaling agent/sensing agent. Ferulic acid increases surface charge

[column 10 lines 55-60] and can be detected with conductometric titration, therefore is conductive. Ferulic acid acts to prevent photo-yellowing and thus is UV-resistant and changes the color of the fiber (whiter). Ferulic acid can act as an antibacterial agent. Further, as Ferulic acid adds an anionic charge to the fiber any cationic additive can be added to the system to provide the properties of the instant claims. Therefore Ferulic acid is capable of being modified.

As for claim 16, PEDERSON discloses oxidizing lignocellulose phenol groups [column 8 lines 25-37] and then contacting the cellulose with a compound with a first functional group, Ferulic acid [column 10 lines 25-30]. Subsequent to this step the lignocellulosic fiber is contacted with an additional component a strengthening agent cationic starch or cationic polyacrylate [column 9 lines 1-16]. The polyacrylate increases the strength of the fiber matrix. The strength of the fiber matrix can be tested with physical strength testing therefore polyacrylate acts as a signaling agent. Further, it is the examiners position that polyacrylate could be detected by way of mass spectroscopy as the addition to fibers would alter the chemical composition.

As for claim 18, Ferulic acid has more than one functional site including double bonds and a phenol, hydroxyl groups, and carboxyl groups which are functional sites. PEDERSON also discloses various other substances with multiple functional groups [column 5 lines 9-4].

As for claims 2, 6, 17, 19, 20, 21, 23 24, 28, and 29 PEDERSON discloses laccases, peroxidases, and oxidases for oxidizing the phenolic group [column 6 lines 1-30]. PEDERSON also discloses peroxides and oxygen oxidants including atmospheric air [column 7 lines 60-67 and column 8 lines 1-10].

As for claim 25 PEDERSON discloses the consistency ranges of 0.1 to 40% which overlaps with the instant claimed range with sufficient specificity [column 5 lines 3-7].

As for claim 26, PEDERSON discloses the temperature range of 20-80 degrees C which falls within the instant claimed range [column 8 lines 30-32].

As for claim 27, JASCHINSKI discloses the treatment consistency ranges of 0.1 to 40% which overlaps with the instant claimed range with sufficient specificity [column 5 lines 3-7]. At a 40% consistency a majority of the water has been removed and the pulp can be considered a fibrous web.

As for claim 30, it is not clear the steps or the amount of radiation emitted onto the fiber, or consistency of the fiber. As paper web/pulp are subjected to light on a paper machine, at least some light radiation (including UV) strikes the pulp/paper web capable of oxidizing a phenol group. Examiner notes peroxide with ultraviolet light forms hydroxyl radicals, an advanced oxidation process.

As for claim 31, PEDERSON discloses that treatment can take place sequentially or simultaneously.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. 2003/0186036 GOODELL et al., hereinafter GOODELL.

As for claim 30, GOODELL discloses activating/oxidizing lignocellulosic materials and other phenoxy containing compounds [abstract, 0026 and 0029]. GOODELL discloses that the fiber is oxidized with peroxide and Fenton reagents [0023 and 0081]. GOODELL discloses the use of quercetin and kaemferol (kaempherol) [0099] during the reaction in addition to other compounds. GOODELL discloses that UV light can be used as a substitute for Fenton reagent during a reaction. At the time of the invention it would have been prima facie obvious to

substitute UV activation for FENTON activation. A person of ordinary skill in the art would expect the negatives and positives of the substitution as disclosed by GOODELL [pg. 3 Table 1].

13. Claim 22 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over 6,187,136 PEDERSEN et al., hereinafter PEDERSON.

PEDERSON discloses 0.001-10 mg enzyme per gram dry matter which is the instant claimed range [column 6 lines 60-67]. The applicant claims an enzyme dosage nkat/g (nanokatal/g) which the examiner has interpreted as an enzyme activity on pulp. However, the applicant does not state what the defined assay conditions this enzyme activity is measured. At different temperatures an enzyme can have different activities. Therefore the examiner cannot determine the proper metes and bounds of patent protection desired by the applicant. PEDERSEN discloses 0.02 LACU/g -2000 LACU/g [column 6 lines 40-47] of enzyme where an LACU is measured under disclosed conditions [column 6 lines 55-60]. Until shown otherwise the examiner has interpreted these ranges to overlap with the instant claimed ranges [since the applicant fails to define the units].

Alternatively, at the time of the invention it would have been obvious to optimize the enzyme activity on pulp [2144.05 (II) (B) Optimization of ranges and result effective variables]. PEDERSEN clearly shows enzyme activity on pulp to be a result effective variable and therefore its optimization would have been obvious to a person of ordinary skill, absence evidence of unexpected results.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY J. CALANDRA whose telephone number is (571) 270-5124. The examiner can normally be reached on Monday through Thursday, 7:30 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on (571) 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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AJC

/Eric Hug/
Primary Examiner, Art Unit 1791